Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$(1-a/n)(1-b/n)(1-c/n)(1-d/n)=\frac{3}{4}.\frac{7}{10}.\frac{3}{5}.\frac{1}{2}=\frac{63}{400}.$

$(a/n)(1-b/n)(1-c/n)(1-d/n)=\frac{1}{4}.\frac{7}{10}.\frac{3}{5}.\frac{1}{2}=\frac{21}{400}.$

$(1-a/n)(b/n)(1-c/n)(1-d/n)=\frac{3}{4}.\frac{3}{10}.\frac{3}{5}.\frac{1}{2}=\frac{27}{400}.$

$(1-a/n)(1-b/n)(c/n)(1-d/n)=\frac{3}{4}.\frac{7}{10}.\frac{2}{5}.\frac{1}{2}=\frac{42}{400}.$

$(1-a/n)(1-b/n)(1-c/n)(d/n)=\frac{3}{4}.\frac{7}{10}.\frac{3}{5}.\frac{1}{2}=\frac{63}{400}.$

$(a/n)(b/n)(1-c/n)(1-d/n)=\frac{1}{4}.\frac{3}{10}.\frac{3}{5}.\frac{1}{2}=\frac{4}{400}.$

$(a/n)(1-b/n)(c/n)(1-d/n)=\frac{1}{4}.\frac{7}{10}.\frac{2}{5}.\frac{1}{2}=\frac{14}{400}.$

$(a/n)(1-b/n)(1-c/n)(d/n)=\frac{1}{4}.\frac{7}{10}.\frac{3}{5}.\frac{1}{2}=\frac{21}{400}.$

$(1-a/n)(b/n)(c/n)(1-d/n)=\frac{3}{4}.\frac{3}{10}.\frac{2}{5}.\frac{1}{2}=\frac{18}{400}.$

$(1-a/n)(b/n)(1-c/n)(d/n)=\frac{3}{4}.\frac{3}{10}.\frac{3}{5}.\frac{1}{2}=\frac{27}{400}.$

$(1-a/n)(1-b/n)(c/n)(d/n)=\frac{3}{4}.\frac{7}{10}.\frac{2}{5}.\frac{1}{2}=\frac{42}{400}.$

$(a/n)(b/n)(c/n)(1-d/n)=\frac{1}{4}.\frac{3}{10}.\frac{2}{5}.\frac{1}{2}=\frac{6}{400}.$

$(a/n)(b/n)(1-c/n)(d/n)=\frac{1}{4}.\frac{3}{10}.\frac{3}{5}.\frac{1}{2}=\frac{9}{400}.$

$(a/n)(1-b/n)(c/n)(d/n)=\frac{1}{4}.\frac{7}{10}.\frac{2}{5}.\frac{1}{2}=\frac{14}{400}.$

$(1-a/n)(b/n)(c/n)(d/n)=\frac{3}{4}.\frac{3}{10}.\frac{2}{5}.\frac{1}{2}=\frac{18}{400}.$

$(a/n)(b/n)(c/n)(d/n)=\frac{1}{4}.\frac{3}{10}.\frac{2}{5}.\frac{1}{2}=\frac{6}{400}.$

187. Proposed by HENRY HEATON, Belfield, N. D.

Through every point of a given square straight lines are drawn in every possible direction, terminating in the sides of the square. What is the average length of such lines?

Solution by the PROPOSER.

Let x and y be the coordinates of one of the points, and θ=the angle one of the lines makes with the side taken as the Y-axis. Then the length of the line from the point to the side taken as the X-axis is $y\sec\theta$.

It is only necessary to find the average length of this line, for the average length of lines drawn to the other sides is evidently the same.

When the line passes through the origin, $y\tan\theta=x$. Hence the limits of θ are 0 and $\tan^{-1}(x/y)$. Hence, the required average is,

$$A=\int_0^a\int_0^a\int_0^{\tan^{-1}(x/y)} y\sec\theta\,dx\,dy\,d\theta\div\int_0^a\int_0^a\int_0^{\tan^{-1}(x/y)} dx\,dy\,d\theta$$

$$=\int_0^a\int_0^a \log\left(\frac{x}{y}+\frac{\sqrt{(x^2+y^2)}}{y}\right)dxy\,dy\div\int_0^a\int_0^a \tan^{-1}\left(\frac{x}{y}\right)dx\,dy$$

$$=\int_0^a\left[\frac{a^2}{2}\log\left(\frac{x+\sqrt{(a^2+x^2)}}{a}\right)+\frac{x}{2}\sqrt{(a^2+x^2)}-\frac{x^2}{2}\right]dx$$

$$\div\int_0^a\left[a\tan^{-1}\left(\frac{x}{a}\right)+\frac{x}{2}\log\left(\frac{a^2+x^2}{x^2}\right)\right]dx=\frac{2a}{\pi}[\log(1+\sqrt{2})-\tfrac{1}{3}(\sqrt{2}-1)]$$

$$=.4095a.$$

Also solved by G. B. M. Zerr, whose solution will appear in the next issue.